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EXAMINER
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SMITH, JEFFREY S

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/675,944  
Filing Date: October 02, 2003  
Appellant(s): SHAKED, DORON

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Timothy Kang  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed March 11, 2008 appealing from the Office action mailed September 4, 2007.

**(1) Real Party in Interest**

A statement identifying by name the real party of in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The Examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments after Final**

No amendment after final has been filed.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is wrong.

The only issue that is ripe for appeal is the rejection of claims 1-3, 14-15 and 23 under 35 U.S.C. 103(a).

The objection to the drawings and the objection to the requirement for information are not appealable. The MPEP states

706.01 [R-2] Contrasted With Objections

The refusal to grant claims because the subject matter as claimed is considered unpatentable is called a "rejection." The term "rejected" must be applied to such claims in the examiner's action. If the form of the claim

(as distinguished from its substance) is improper, an “objection” is made. An example of a matter of form as to which objection is made is dependency of a claim on a rejected claim, if the dependent claim is otherwise allowable. See MPEP § 608.01(n). The practical difference between a rejection and an objection is that a rejection, involving the merits of the claim, is subject to review by the Board of Patent Appeals and Interferences, while an objection, if persisted, may be reviewed only by way of petition to the \*>Director of the USPTO<. Similarly, the **Board will not hear or decide issues pertaining to objections and formal matters which are not properly before the Board. These formal matters should not be combined in appeals to the Board.**

The objection to the requirement for information under 37 cfr 1.105 is reviewable by petition to the director of this technology center. Applicant has yet to do this. Therefore, applicant's arguments on pages 15-16 of the appeal brief have not been addressed in this answer, because this issue is not yet ripe for appeal.

The objection to the drawings under 37 cfr 1.83(a) is reviewable by petition to the director of this technology center. Applicant has yet to do this. Therefore, applicant's arguments on pages 16-19 of the appeal brief have not been addressed in this answer, because this issue is not yet ripe for appeal.

#### **(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

#### **(8) Evidence Relied Upon**

International Publication Number WO 02/089062 by Kimmel et al. (“Kimmel”); admitted prior art from the application as originally filed, and U.S. Patent Publication Number 2004/0091164 by Sakatani et al. (“Sakatani”).

## **(9) Grounds of Rejection**

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 14-15, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over International Publication No. WO 02/089062 by Kimmel et al. ("Kimmel") in view of admitted prior art and further in view of U.S. Patent Application Publication Number 2004/0091164 by Sakatani et al. ("Sakatani").

For claim 1, Kimmel discloses a non-linear illumination estimation module that receives images and produces corresponding interim illumination estimations. (See the "non-linear (max) operation" on page 3 performed by estimation module 104 as shown in figure 2). The non-linear estimation device of Kimmel includes log module 102, non-linear module 104, and summer 108.

Kimmel does not explicitly disclose a down-sampling module, an up-sampling module, and an illumination manipulation module.

Figure 2 of the admitted prior art discloses a down-sampling module, an up-sampling module and an illumination manipulation module. (See page 2 of the specification, in a "prior art Retinex-type algorithm, the illumination L is obtained from a sub-sampled version of the input image"). Figure 2 also shows an up-sampling module.

(See page 3, “an up-sample module 34” produces “an estimation of the illumination ... using interpolation”) and an illumination manipulation module 180.

It would have been obvious to one of ordinary skill in the art at the time of invention to down-sample the input images before sending them to the non-linear retinex algorithm modules 102, 104, and 108 of Kimmel in order to speed up the computationally intensive retinex process, as taught in the admitted prior art on page 3 of the specification. That is, the images are down-sampled by down sample module 32 of the admitted prior art to reduce the amount of data to be processed. Then, the log of the down-sampled image is taken by log device 102 of Kimmel, and the illumination is estimated by non-linear estimator 104 of Kimmel. The output is up-sampled by up sample module 34 of the admitted prior art.

The Supreme Court has held that in analyzing the obviousness of combining elements, a court need not find specific teachings, but rather may consider “the background knowledge possessed by a person having ordinary skill in the art” and “the inferences and creative steps that a person of ordinary skill in the art would employ. *See KSR Int’l v. Teleflex Inc.*, 127 S. Ct. 1727, 1740-41, 82 USPQ2d 1385, 1396 (2007). To be nonobvious, an improvement must be “more than the predictable use of prior art elements according to their established functions.” *Id.* Here all elements of the claim are known in the prior art. Also, the combination is the predictable use of two image processing methods, a down sampling method of the admitted prior art and a non-linear illumination estimation method of Kimmel, according to their established functions, to achieve the predictable result of estimating illumination.

The reverse is also true. That is, it would have been obvious to a person of ordinary skill in the art at the time of invention to replace the linear illumination estimation module 30 as shown in figure 2 of the admitted prior art with the non-linear estimator device which includes modules 102, 104 and 108 of Kimmel. The intended purpose of the linear illumination module 30 of the admitted prior art is to estimate the illumination of the image. The intended purpose of the non-linear estimation module of Kimmel is to estimate the illumination of the image. Thus, one of skill in the art would be able to substitute the non-linear module of Kimmel for the linear module of the admitted prior art to achieve the predictable result of estimating the illumination.

Sakatani discloses “the resolution of the blurred image produced by the formula (7) is changed to match with the resolution of the original image  $I_j(x, y)$  by interpolation” (see paragraph 118). The admitted prior art further discloses “using the high resolution input image S to select corresponding output pixels” when “the interpolation is performed on a set of smooth, low resolution intermediate images” (see page 3).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have an upsampling module that uses the input image as a guide in the interpolation for the benefit of performing Retinex type processing as taught by both the admitted prior art and Sakatani.

For claim 2, the admitted prior art discloses that the up-sampling module is configured to implement an interpolation routine. (See page 3 of the specification).

For claim 3 Kimmel discloses an illumination estimation that comprises local maximum routine. (See Kimmel at page 3).

Method claims 14-15, which contain elements similar to the elements of apparatus claims 1-3 expressed in the form of a process, are rejected for the reasons given in the rejection of claims 1-3. Nevertheless, in the interest of clarity, the Examiner will expressly address the elements of claims 14-15.

For claim 14 the admitted prior art discloses producing one or more low resolution input images by sub-sampling the high resolution input image (32), generating an interim illumination estimation for each of the one or more low resolution input images (30), generating an illumination estimation suitable for Retinex type correction by up-sampling the interim illumination estimations (34) and combining the input image and the interim illumination estimation (20).

Sakatani discloses “the resolution of the blurred image produced by the formula (7) is changed to match with the resolution of the original image  $I_i(x, y)$  by interpolation” (see paragraph 118). The admitted prior art further discloses “using the high resolution input image S to select corresponding output pixels” when “the interpolation is performed on a set of smooth, low resolution intermediate images” (see page 3). The admitted prior art also discloses generating the illumination estimation by combining the input image and the interim illumination estimation.

It would have been obvious to one of ordinary skill in the art at the time of the invention to generate the illumination estimation by combining the input image and the interim illumination estimations for the benefit of performing Retinex type processing as taught by both the admitted prior art and Sakatani.



For claim 15 the admitted prior art discloses receiving the interim illumination estimations and a sampling rate to produce the illumination estimation (34), and Kimmel discloses enforcing an envelope requirement by applying a local maximum routine (max operation on page 3 line 21). The Supreme Court has held that in analyzing the obviousness of combining elements, a court need not find specific teachings, but rather may consider “the background knowledge possessed by a person having ordinary skill in the art” and “the inferences and creative steps that a person of ordinary skill in the art would employ. See *KSR Int’l v. Teleflex Inc.*, 127 S. Ct. 1727, 1740-41, 82 USPQ2d 1385, 1396 (2007). To be nonobvious, an improvement must be “more than the predictable use of prior art elements according to their established functions.” *Id.* Here all elements of the claim are known in the prior art. Also, the combination is the predictable use of two image processing methods, a down sampling method of the admitted prior art and a non-linear illumination estimation method of Kimmel, according to their established functions, to achieve the predictable result of estimating illumination.

For claim 23, the admitted prior art discloses an illumination manipulation module wherein the input image and the illumination estimation are combined.

### **(10) Response to Arguments**

Applicant argues that Kimmel does not disclose “a non-linear estimation module.” In fact, figure 2 of Kimmel shows an iterative estimator 104 that estimates illumination using a non-linear max operation as shown on page 3.

Applicant further argues that the non-linear estimation module of Kimmel does not receive sub-sampled images. However, the admitted prior art shown in figure 2 of the application includes sub-sampled images received by an estimation module. When the linear estimation module of the admitted prior art shown in figure 2 of the application is replaced by the non-linear estimation module 104 of Kimmel, the result is receiving sub-sampled images at the non-linear estimation module, which then produces interim illumination estimations corresponding to the sub-sampled images. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant argues that the Examiner has argued that it would have been obvious to replace the logarithmic module, the summer, and the expander in Kimmel et al. with the down-sampling module, the up-sampling module, and the illumination module of the admitted prior art.” In fact, the Examiner made no such statement. The combination of figure 2 of Kimmel in view of figure 2 of the admitted prior art includes the log module 102 and the non-linear estimator 104 Kimmel, which receives a down-sampled image from module 32 of the admitted prior art, takes the log of the image, then estimates the

illumination as shown by figure 2 of Kimmel. The result is sent to up-sample module 34 of the admitted prior art.

The intended purpose of the down-sampling module of the admitted prior art is to reduce the amount of processing time that is required for the estimation module to estimate the illumination of the image. The intended purpose of the linear illumination estimation module of the admitted prior art is to estimate the illumination of the image. The intended purpose of the non-linear estimation device which includes modules 102, 104 and 108 is to estimate the illumination of the image. Thus, the output of the non-linear estimation device, when combined with the down-sampling of the admitted prior art, would be an estimate of the illumination of the down-sampled image.

Applicant argues that Sakatani by itself does not produce "an illumination estimation by using an input image as a guide in the interpolation." Applicant further argues that the admitted prior art by itself does not produce "an illumination estimation by using an input image as a guide in the interpolation.

However, Sakatani uses an input image as a guide in up-sampling a low resolution blurred retinex image (paragraphs 114-117, an original image is prepared from lowering the resolution of an original image, and a blurred image is prepared from the low resolution image (paragraph 114). The original image is then used to adjust the resolution of the blurred image, so that the original and blurred images have matching resolution (paragraph 117)). The admitted prior art discloses using the original input image as a guide in interpolation (the interpolation is performed on a set of low

resolution images using the high resolution image to select corresponding output pixels (page 3 of the specification)).

The fact that the admitted prior art uses the original image as a guide in interpolation performed by the illumination manipulation module 20 does not preclude an engineer of ordinary skill in the art from using the original image as a guide in the interpolation performed by the up-sampling module 34, as taught by Sakatani in paragraph 117. Therefore, the combination of the admitted prior art and Sakatani discloses "an up-sampling module configured to receive the input image and to interpolate the interim illumination estimations to produce an illumination estimation by using the input image as a guide in the interpolation," as recited in claim 1.

For claims 14 and 15, applicant argues that the combination of the admitted prior art, Kimmel and Sakatani do not disclose all elements of these claims. Claims 14 and 15, which have elements similar to apparatus claims 1 and 3 expressed in method form, are rejected for reasons given in the rejection of claims 1-3. The Examiner's response to applicant's arguments for claims 14-15 have been expressed in the response to arguments for claims 1-3.

#### **(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Jeffrey S. Smith

May 13, 2008

Conferees:

/Jingge Wu/

Supervisory Patent Examiner, Art Unit 2624

/Brian P. Werner/

Supervisory Patent Examiner, Art Unit 2624